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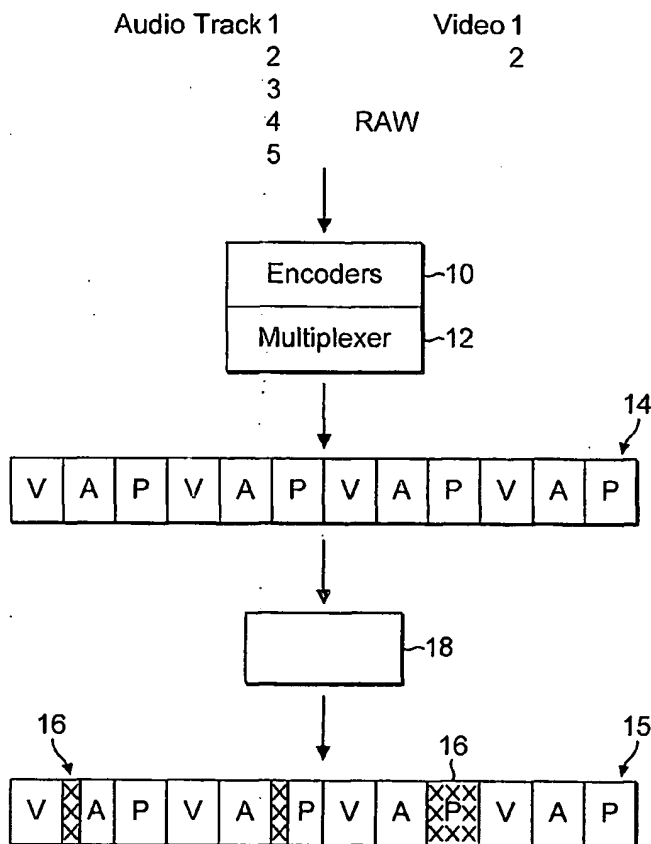
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[Continued on next page]

(54) Title: COPY PROTECTION FOR TRANSMISSION OF INFORMATION

(57) Abstract: It is proposed to copy protect data files for transmission by incorporating DSV data patterns, that is, data patterns which are difficult to encode without causing DSV problems, in the data files. The data in five audio streams and two video streams is placed, by way of encoders (10) and a multiplexer (12) into a stream of blocks of encoded data in the MPEG file format (14). In this format, blocks of video data V are arranged alternately with blocks of audio data A and padding stream blocks P. DSV data patterns (16) are incorporated into the MPEG file (14) by way of an encoder (18) to produce the copy protected data file (15). The DSV data patterns (16) are incorporated into locations within the MPEG file which have no data content such as padding stream blocks P and/or into unused audio data blocks A. The DSV data patterns incorporated within the data blocks fed either to a monitor or to a reproduction system will not interfere with the reproduction such that unfettered access is provided to the transmitted information. However, a CD or DVD writer will generally be caused to write a disc which, when read, will result in a reader returning corrupted data or information signalling a read error. Thus, the data in the MPEG file (14) has been copy protected.

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COPY PROTECTION FOR TRANSMISSION OF INFORMATION

The present invention relates to a method of copy protecting data files for the transmission of information and to a data file to be used in the transmission of information.

Increasingly it is required to make information, such as films, music videos, games and other multimedia presentations, available electronically. For example, such information content may be transmitted by way of the internet, by broadcast TV, or by cable for display on the screen of a computer or by a television set. Thus, it may be required to make a film available electronically to a user on the payment of an appropriate fee.

However, recordable CDs and CD writers for writing to such recordable discs are readily available to the domestic consumer and recordable DVDs and DVD writers are expected to become as readily available in the short term. There is therefore the risk that when information content of the type described is made available in electronic form, for example, by way of the internet, the consumer may be enabled not only to use the content as intended but also to make copies thereof onto appropriate optical discs.

There is therefore a need to control the use to which the transmitted information can be put.

The present invention seeks to provide a method of copy protecting data files for the transmission of information.

Throughout the specification and claims, the term "DSV data patterns" means data patterns which are likely to be difficult to encode without the encoded data causing DSV problems.

Thus, when "DSV data patterns" are encoded and written to an optical disc, for example, by a writer, a reader or player of encoded data incorporating the DSV data patterns will experience DSV problems.

According to a first aspect of the present invention there is provided a

method of copy protecting data files for the transmission of information, where the information has been encoded into a data file having a format suitable for transmission, the method comprising incorporating into the data file DSV data patterns as hereinbefore defined, the DSV data patterns being chosen and
5   located such that the data file cannot be accurately written to an optical disc.

The applicants have found that the inherent limitations of currently available CD and DVD writers can be used in copy protection techniques. Thus, and as described in their earlier application No. WO 02/11136, the applicants
10   have found that it is possible to provide DSV data patterns which, because of their size and/or nature, cannot be accurately written onto a disc by a writer for recordable discs such that the disc remains reliably readable. However, the much more sophisticated encoders used in mastering houses, for example, the encoder which controls a laser beam recorder, can be controlled to accurately
15   write the DSV data patterns to the glass master.

The encoder associated with a laser beam recorder has a relatively large amount of memory and processing power at its disposal. Specifically, the encoder uses sophisticated algorithms to analyse the information, including the
20   DSV data patterns, which is to be encoded and written to the disc. The purpose of these algorithms is to ensure that this information is encoded onto the glass master in a manner which ensures that the information on the discs produced using this glass master can be read correctly by all CD and DVD readers. For a CD, the encoder chooses the merge bits which are interspersed in the encoded
25   data as part of the encoding process and the chosen merge bit pattern ensures the readability of the replica discs made from the glass master. Similarly, for a DVD, the encoder chooses the sequence of channel bits to ensure readability. These sophisticated encoders can compromise the readability of one area of disc slightly, to ensure the readability of another area of disc, the overall effect
30   being to ensure that the whole disc has a uniformly high readability.

By contrast, commercially available CD and DVD writers are limited in the processing power and memory which can be brought to bear on the problem of encoding the data. Specifically, the encoder built into a writing device contains
35   simpler encoding algorithms because complicated algorithms require more processing power, more memory and they are more expensive to design, write and debug which reduces the profit margin on the writer. These simpler

encoding algorithms may not make the ideal choices for merge bits or the sequence of channel bits even when the better choices are readily available. If one area of disc is easy to encode so as to ensure high readability and the following region is difficult to encode and would have a low readability, the

5 simple encoders in writers do not have the foresight to trade-off the readability of one area with another and the result is that the easily encoded region is encoded well and the region which is difficult to encode is encoded badly and when the disc is read, errors are found in this latter region.

10 In the applicants' earlier application No. WO 02/11136, an authenticating signature is applied to an optical disc, the signature having been chosen to utilise the inherent limitations of currently available disc writers and to provide DSV problems.

15 In their copending application No. 0304015.1, filed on 21st February 2003, the applicants describe and claim the provision of DSV data patterns in an application file to be carried on an optical disc, such that these DSV data patterns work with the inherent limitations of optical disc writers to provide copy protection for the application carried on the optical disc.

20
With embodiments of the present application, DSV data patterns are incorporated into data files for transmission. Where these data files are received, for example, at a user computer or by a player of the transmitted data, they can be accessed and used without difficulty. However, if the user writes the

25 received data files to an optical disc the resultant copy will have readability problems such that it will be difficult to play or use the information recorded on the optical disc.

There may be circumstances where, for example, it is required to transmit

30 the data file, which incorporates the DSV data patterns, to a mastering house so that the data file can be applied to a glass master. However, the encoder associated with the laser beam recorder should be able to write the data file to the glass master in a manner to ensure readability. Alternatively, and if required, a special encoder could be used to write the data file to disc. In either case, the

35 resulting optical discs will, in their turn, be copy protected by the incorporated DSV data patterns.

In an embodiment, the data file comprises a stream of blocks of encoded data, and the method further comprises incorporating the DSV data patterns into one or more selected blocks in the stream which do not have information content.

.5

Preferably, the DSV data patterns are only incorporated into part of the or each selected block.

The data file format may be, for example, MPEG, Windows compressed
10   media files, AVI files or any other file format for encoding and compressing video.

Preferably, the DSV data patterns are chosen to cause DSV problems for optical disc writers.

15

For example, the DSV data patterns may be chosen to ensure that the DSV has a significant absolute value.

In an embodiment, the DSV data patterns are repeated patterns of
20   values. These patterns of values may be randomly chosen.

The size of the DSV data patterns may be a predetermined amount.

It is generally thought that the effectiveness of the DSV data patterns is
25   maximised where the DSV data patterns are arranged to produce a DSV which has a rapid rate of change.

In addition, it is preferred that the DSV data patterns are arranged to produce a DSV which has a substantial low frequency component.

30

As is well known, the information in the data file may comprise one or more of: audio data, numerical data, text data, video data, graphics data, program data, animation data and/or any other data.

35   According to a further aspect of the present invention there is provided a data file to be used in the transmission of information, the data file comprising a stream of blocks into which the information has been encoded, and wherein

DSV data patterns as hereinbefore defined have been incorporated into one or more selected blocks in said stream of blocks.

In an embodiment, the DSV data patterns have only been incorporated into part of the or each selected block.

Preferably, the DSV data patterns have only been incorporated into selected blocks which are without information content.

The data file may have, for example, the format of MPEG, Windows compressed media files, AVI files or any other file format for encoding and compressing video.

Where the data file is in MPEG format and the stream of blocks comprises video data, audio data and padding stream blocks arranged alternately, the DSV data patterns are preferably incorporated in selected blocks without information content. For example, the DSV data patterns may be incorporated in padding stream blocks and/or in unused audio data blocks.

Preferably, said DSV data patterns have been chosen to cause DSV problems for optical disc writers.

In an embodiment, the DSV data patterns are chosen to ensure that the DSV has a significant absolute value.

The DSV data patterns may be repeated patterns of values.

The size of the DSV data patterns may be a predetermined amount.

It is preferred that the DSV data patterns are arranged to produce a DSV which has a rapid rate of change. It is currently thought that this is the most effective way to ensure reading problems for copy discs.

Preferably, the DSV data patterns are arranged to produce a DSV which has a substantial low frequency component.

6

The present invention also extends to an optical disc carrying a data file as defined above.

An optical disc of the invention may be a legitimate, copy protected
5   optical disc, which has been produced using an encoder able to record and
·encode the DSV data patterns without providing readability problems on the
resultant disc.. Alternatively, an optical disc of the invention may be a copy disc
produced by a CD or DVD writer.

10   The present invention also extends to a storage device containing a data
file as defined above.

For example, the data file may be contained on the hard disc or in other
memory of a user's computer or of a server.
15

Embodiments of the present invention will hereinafter be described, by
way of example, with reference to the accompanying drawings, in which:
Figure 1 shows the surface of a compact disc, very much enlarged,
showing the pits thereon;
20   Figure 2 shows a cross-section of a pit illustrating the data associated
therewith;
Figure 3 shows the DSV associated with pits and lands of a compact disc;
Figure 4 shows the provision of a data file in MPEG format and the
application of DSV data patterns thereto;
25   Figure 5 shows schematically the transmission and decoding of the copy
protected data file of Figure 4; and
Figure 6 indicates the recording of the data file of Figure 4 onto an optical
disc.

30   The copy protection technique of this invention relies upon the use of
DSV data patterns as described, for example, in WO 02/11136. A brief
description explaining DSV and how it is utilised now follows. This description
begins specifically by reference to the encoding of a CD-ROM. However, it will
be appreciated that the present invention is not limited to use with a CD-ROM
35   and finds application to all data carrying optical discs. Specifically, the invention
is applicable to all formats of CDs and to all formats of DVDs.

Figure 1 shows an enlarged view of part of a CD showing the pits 6 thereon. As is well known, these pits extend along a spiral track on the surface of the disc and are separated by lands.

5   Figure 2 shows a section through a pit 6 and land 8 illustrating how data is encoded on a CD. The pits and lands do not represent binary 0s and 1s, but instead represent transitions from one state to another. The data signal is stored in NRZI form (Non-Return to Zero Inverted), where the signal is inverted every time a 1 is encountered. Figure 2 shows the binary value 00100010.

10

The data stream always consists of pits and lands of at least 3 bits and at most 11 bits long. This is sometimes referred to as a 3T-11T where T is a 1 bit period. A 3T pit has the highest signal frequency (720khz) and an 11T pit has the lowest signal frequency (196khz).

15

A data signal is derived from the lengths of the pits and lands. The produced signal forms a square wave known as an EFM signal. The digital sum value (DSV) is the running difference between the number of T values where the EFM represents a pit and the number of T values where the EFM represents a
20   land. As each data bit is read, the DSV is incremented or decremented depending upon whether the data bit corresponds to a pit or a land.

Figure 3 shows the DSV associated with pits and lands on a disc. As is indicated in Figure 3, the DSV is determined by assigning the value +1 to each
25   land T, and –1 to each pit T. Ideally, the DSV should stray as little as possible from the zero level. If the DSV has a rapid rate of change over a significant period of time or if the DSV has substantial low frequency components then the transitions in the EFM signal may be shifted from their ideal values and/or the ability of tracking and focus circuits in CD drives to maintain optimal head
30   positioning may be compromised. This typically causes read failures from the CD.

Original data, in 8 bit bytes, is passed through a process called EFM encoding to produce the 14 bit symbols, often referred to as channel bits. The
35   set of 14 bit symbols is especially designed:
    to level out the number of pits and lands, to help maintain balanced DSV; and

8

to ensure that there are no symbols which break the EFM coding scheme of 3T-11T.

Another way of regarding the 3T-11T coding scheme is that the number of successive zeros must be greater than or equal to two and less than or equal to ten. It is immediately apparent that this requirement may be compromised where two 14 bit symbols follow one after the other. Accordingly, a set of 3 merge bits are added between each 14 bit symbol and the one following to ensure that there are no violations of the 3T-11T coding scheme and to ensure that a suitable DSV is maintained.

The merge bits contain no useful data and the algorithm used to generate their values can differ from drive to drive. Once read, the merge bits are discarded and the data contained in the 14 bit symbol is passed onto the next process.

The above describes the basic encoding scheme for a CD and will be known to those skilled in the art. Accordingly, further explanation thereof is not required.

As set out above, embodiments of this invention utilise the inherent · limitations of currently available CD or DVD writers.

The encoding of a CD is subject to two rigorous conditions and one more vague requirement. The first strict rule is that the encoded data must decode without errors into the data which the provider of the content wanted on the disc. The second strict rule is that the encoding must obey the run-length limiting rules so that no pits· or lands are longer than 11T or shorter than 3T. The vague requirement is that the DSV characteristics of the disc should be as good as possible.

As set out above, DSV is a property of the encoded data. It is a running difference between the number of pit T states and the number of land T states. It is desirable that the DSV should not have high absolute values, should not change rapidly, and should not have low frequency components. This latter requirement means that the DSV should not oscillate in a regular fashion.

9

In order to maintain good DSV characteristics, the encoder often has a choice in the merge bits to insert between the symbols which carry the data. When encoding certain special patterns of data, the encoder has a very much reduced ability to choose merge bits because the run-length limiting rules place
5   limitations on the merge bits which can precede or follow certain symbols. The encoder effectively loses much of its control of the DSV while this data is being encoded. It is critical that it chooses correctly in the few locations where it has a choice.

10   A sophisticated encoder, such as those which control laser beam recorders, may have the foresight, or can be designed, to choose a pattern of merge bits which is not optimal for the immediate locality where this area is followed by one in which the run length limiting rules dictate the merge bits. The result will be that the overall DSV for the two areas will have better properties.
15   The ability to detect upcoming areas where the merge bit choices are limited is called "look-ahead". Encoders with a larger look-ahead will be able to make more preparations for encoding the troublesome data and hence the overall encoding will be better. CD writers typically have very little ability to look ahead and hence when they lose control of the DSV, it is more likely to result in an
20   unreadable disc.

The applicants have identified a number of symbol values which are capable of causing DSV problems because of their EFM pattern at the pits and lands level. When the patterns for these values are processed through the EFM
25   decoder of a CD drive, the DSV accumulates or decrements and this can result in read failures. Of course, and as indicated above, the encoding process for a CD is designed to prevent values capable of causing DSV problems occurring in the EFM pattern as well as providing robust error correction.

30   As will also be well known, DVDs are subject to encoding known as EFMPlus. In this scheme the 8 bit data words are encoded into 16 bit channel bits and state machines are used to choose the 16 bit symbols. As this choice can be made so that the coding scheme is not compromised, a flexibility given by the increased number of bits in each symbol, merge bits are not required.
35
On decoding, the information that was present in the 8 bit data words is recreated but the encoding scheme is lost.

As set out above, this invention proposes that DSV data patterns, that is, data patterns which are difficult to encode without causing DSV problems, be incorporated in data files for transmission. The invention is described below and illustrated with specific reference to the incorporation of DSV data patterns into
5   MPEG files. However, the invention is not limited to use with MPEG files and can be used with any file format for encoding digital information. Where the information is, for example, video and/or audio, the file format may be Windows compressed media files or AVI files.

10   Figure 4 shows schematically the arrangement of audio and video data into an MPEG file 14 and the subsequent application of DSV data patterns thereto. In this respect, the file format shown specifically is MPEG 2, which is currently widely used for the transmission of video, but the invention is equally applicable to other types of MPEG file.
15

As is shown in Figure 4, the data in five audio tracks and two video tracks is placed, by way of encoders 10 and a multiplexer 12 into a stream of blocks of encoded data in the MPEG file format which is indicated at 14. In this format, blocks of video data V are arranged alternately with blocks of audio data A and
20   with padding stream blocks P.

As is illustrated in Figure 4, DSV data patterns, indicated at 16, are incorporated into the MPEG file 14 by way of an encoder 18 to produce the copy protected data file 15. The DSV data patterns 16 are incorporated into locations
25   within the MPEG file which have no data content. Thus, and as illustrated, the DSV data patterns may be incorporated into padding stream blocks P and/or into unused audio data blocks A. The DSV data patterns 16 may be incorporated such that they completely fill each of the selected blocks A and/or P or the DSV data patterns 16 may be accommodated in part only of each
30   selected block A, P. Additionally, and/or alternatively, the DSV data patterns may be inserted in blocks containing data but in an unused area thereof.

Figure 4 illustrates the incorporation of DSV data patterns into the MPEG file 14 after the MPEG file has been created. Of course, the DSV data patterns
35   may alternatively be incorporated within the MPEG file during its creation.

Figure 5 shows schematically the transmission of a copy protected MPEG file 15 which incorporates the DSV data patterns 16. The data file 15 is transmitted by transmission means, indicated at 20, to a receiver, indicated at 22. The transmission means 20 may be the internet, broadcast or satellite TV,
.5   cable TV, or an alternative network. The receiver 22 is, as is well known, provided with three buffers 24, 26 and 28. The buffer 24 receives the video blocks, the buffer 26 receives the audio blocks, and the buffer 28 receives the padding stream blocks. The video data from the buffer 24 is applied to a monitor 30 for display whilst the audio data from the buffer 26 is applied to an
10   audio reproduction system indicated at 32. In this respect, the DSV data patterns incorporated within the blocks fed either to the monitor 30 or to the reproduction system 32 will not interfere with the reproduction such that the consumer will have unfettered access to the transmitted information.

15   Figure 6 shows a writer 52 which is to be used to make a copy of the copy protected MPEG file 15. In this respect, it is assumed that the MPEG file 15 has been stored in memory 64 in a receiver computer. Alternatively, the MPEG file 15 may be stored on hard disc. The data in the MPEG file 15 is encoded by encoder 54 and then written to a recordable optical disc 70, say a CD-R, or a
20   DVD-R, by way of a recording laser 58 and its controller 56. However, the data file 15 incorporates the DSV data patterns 16 and the writer 52 will have difficulty writing the data to the disc 70 without producing a resultant disc which has severe readability problems. Accordingly, the writer 52 will write a disc which, when read, will result in a reader returning corrupted data or information
25   signalling a read error. In this manner, therefore, the data in the MPEG file 14 has been copy protected.

Of course, there may be instances where it will be required to transmit the copy protected MPEG file 15 to, for example, a mastering house for its
30   application to a glass master. Although the mastering process will then look the same as is illustrated in Figure 6, the result will be different in that the encoder, as 54, used at the mastering house will generally be sophisticated enough to write the MPEG file 15 with its incorporated DSV data patterns without producing a disc with readability problems. Alternatively, a special encoder can be used to
35   ensure that there are no readability problems with the discs produced from the glass master.

12

Where the invention is to be used, as indicated in Figure 5, to allow the safe transmission of video for local use but to prevent the data from being accurately written to an optical disc, the DSV data patterns incorporated in the data file can be very robust and arranged to have maximum effect on a disc

5   writer. Where it is intended that the transmitted MPEG file will be recorded legitimately onto a disc, for example, onto a glass master, care will need to be taken as to the number and locations of the DSV data patterns to ensure that there will be no readability problems with the resulting discs.

10   It will be apparent that if an MPEG file, as 15, with incorporated DSV patterns, is encoded onto an optical disc, that disc will be copy protected. In this respect, the application of files incorporating DSV data patterns to optical discs to copy protect the information therein is described in the applicants' copending application No. 0304015.1, filed on 21st February 2003. As noted in that

15   copending application, the application of an MPEG file, for example, incorporating DSV data patterns provides copy protection for the information on the optical disc and is of particular relevance to the rental industry for CDs and DVDs.

20   It will be appreciated that variations in, and modifications to, the embodiments as described and illustrated may be made within the scope of the accompanying claims.

CLAIMS

1.   A method of copy protecting data files for the transmission of information,
where the information has been encoded into a data file having a format suitable
5   for transmission, the method comprising incorporating into the data file DSV
data patterns as hereinbefore defined, the DSV data patterns being chosen and
located such that the data file cannot be accurately written to an optical disc
such that it can be reliably read back.

10   2.   A method as claimed in Claim 1, wherein the data file comprises a stream
of blocks of encoded data, and the method further comprising incorporating the
DSV data patterns into one or more selected blocks in the stream which do not
have information content.

15   3.   A method as claimed in Claim 2, wherein the DSV data patterns are only
incorporated into part of the or each selected block.

4.   A method as claimed in any preceding claim, wherein the data file format
is MPEG, Windows compressed media files, AVI files or any other file format for
20   encoding and compressing video.

5.   A method as claimed in any preceding claim, wherein the DSV data
patterns are chosen to cause DSV problems for optical disc writers.

25   6.   A method as claimed in any preceding claim, wherein the DSV data
patterns are chosen to ensure that the DSV has a significant absolute value.

7.   A method as claimed in any preceding claim, wherein the DSV data
patterns are repeated patterns of values.
30
8.   A method as claimed in any preceding claim, wherein the size of the DSV
data patterns is a predetermined amount.

9.   A method as claimed in any preceding claim, wherein the DSV data
35   patterns are arranged to produce a DSV which has a rapid rate of change.

10.   A method as claimed in any preceding claim, wherein the DSV data

patterns are arranged to produce a DSV which has a substantial low frequency component.

11. A method as claimed in any preceding claim, wherein the information to be transmitted comprises one or more of: audio data, numerical data, text data, video data, graphics data, program data, animation data and/or any other data.

12. A data file to be used in the transmission of information, the data file comprising a stream of blocks into which the information has been encoded, and wherein DSV data patterns as hereinbefore defined have been incorporated into one or more selected blocks in said stream of blocks.

13. A data file as claimed in Claim 12, wherein the DSV data patterns have only been incorporated into part of the or each selected block.

14. A data file as claimed in Claim 12 or Claim 13, wherein the DSV data patterns have only been incorporated into selected blocks which are without information content.

15. A data file as claimed in any of Claims 12 to 14, wherein the DSV data patterns have been incorporated in unused areas of blocks containing data:

16. A data file as claimed in any of Claims 12 to 15, wherein the data file has the format of MPEG, Windows compressed media files, AVI files or any other file format for encoding and compressing video.

17. A data file as claimed in any of Claims 12 to 16, wherein the data file is in MPEG format and the stream of blocks comprises video data, audio data and padding stream blocks arranged alternately, and wherein the DSV data patterns are incorporated in selected blocks without information content.

18. A data file as claimed in Claim 17, wherein the DSV data patterns are incorporated in padding stream blocks.

19. A data file as claimed in Claim 17 or Claim 18, wherein the DSV data patterns are incorporated in audio data blocks.

15

20.   A data file as claimed in any of Claims 12 to 19, wherein said DSV data patterns have been chosen to cause DSV problems for optical disc writers.

21.   A data file as claimed in any of Claims 12 to 20, wherein the DSV data patterns are chosen to ensure that the DSV has a significant absolute value.

22.   A data file as claimed in any of Claims 12 to 21, wherein the DSV data patterns are repeated patterns of values.

23.   A data file as claimed in any of Claims 12 to 22, wherein the size of the DSV data patterns is a predetermined amount.

24.   A data file as claimed in any of Claims 12 to 23, wherein the DSV data patterns are arranged to produce a DSV which has a rapid rate of change.

25.   A data file as claimed in any of Claims 12 to 24, wherein the DSV data patterns are arranged to produce a DSV which has a substantial low frequency component.

26.   An optical disc carrying a data file as claimed in any of Claims 12 to 25.

27.   A storage device containing a data file as claimed in any of Claims 12 to 25.

28.   A method of transmitting information substantially as hereinbefore described with reference to the accompanying drawings.

29.   A data file to be used in the transmission of information substantially as hereinbefore described with reference to the accompanying drawings.
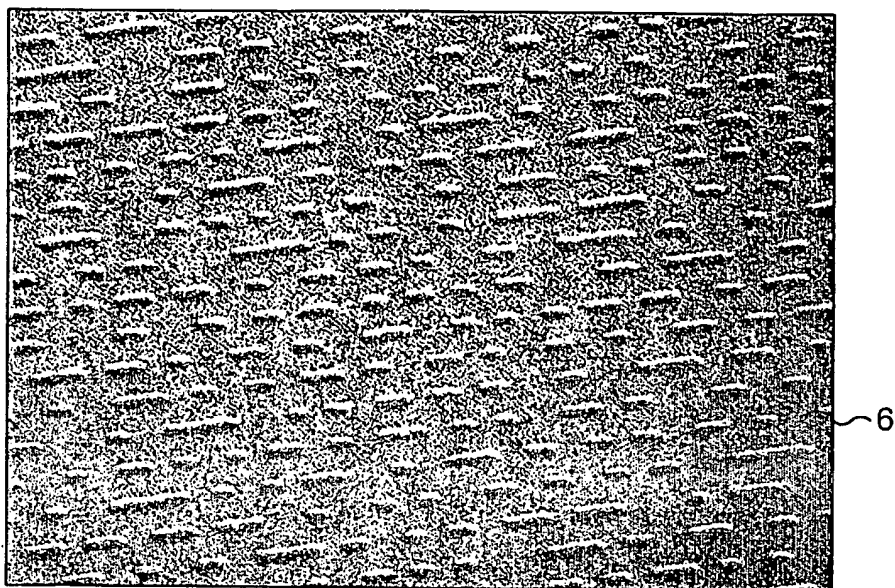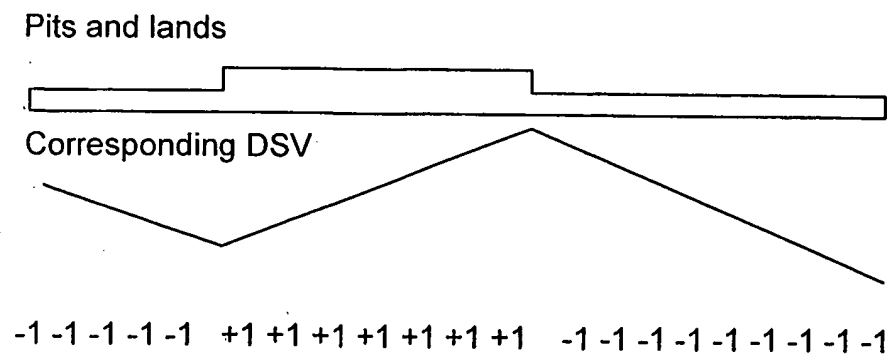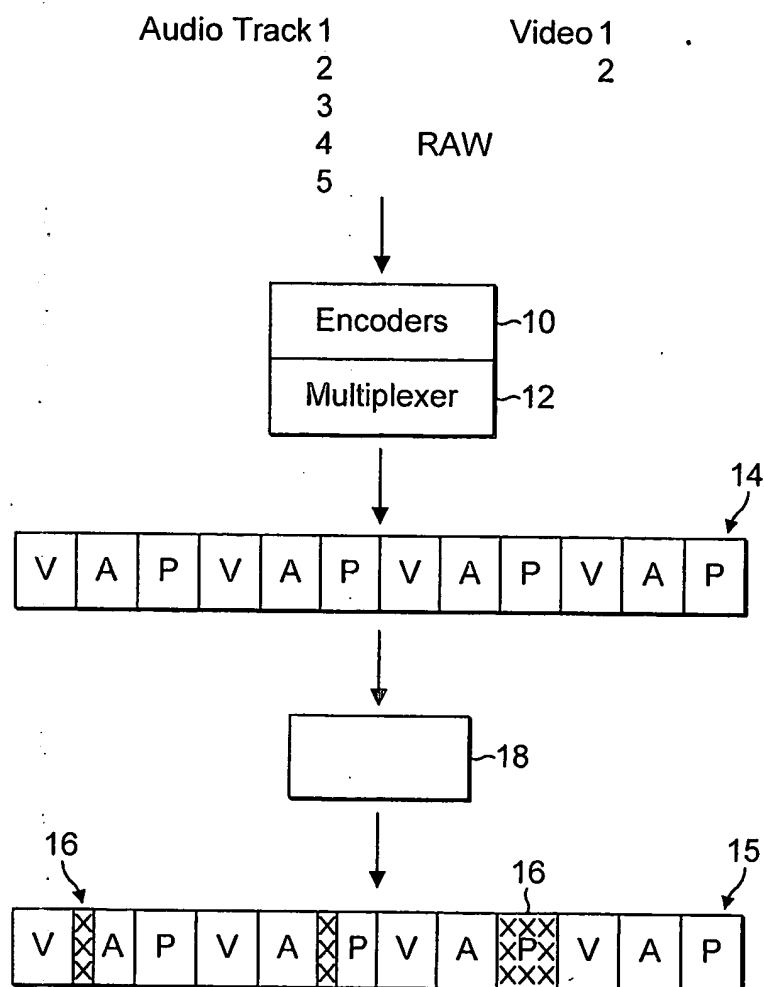
FIG. 1

00   10
   1000   8
              6

FIG. 2

Pits and lands

Corresponding DSV

-1 -1 -1 -1 -1   +1 +1 +1 +1 +1 +1 +1   -1 -1 -1 -1 -1 -1 -1 -1 -1

FIG. 3

Audio Track 1   Video 1
          2   2
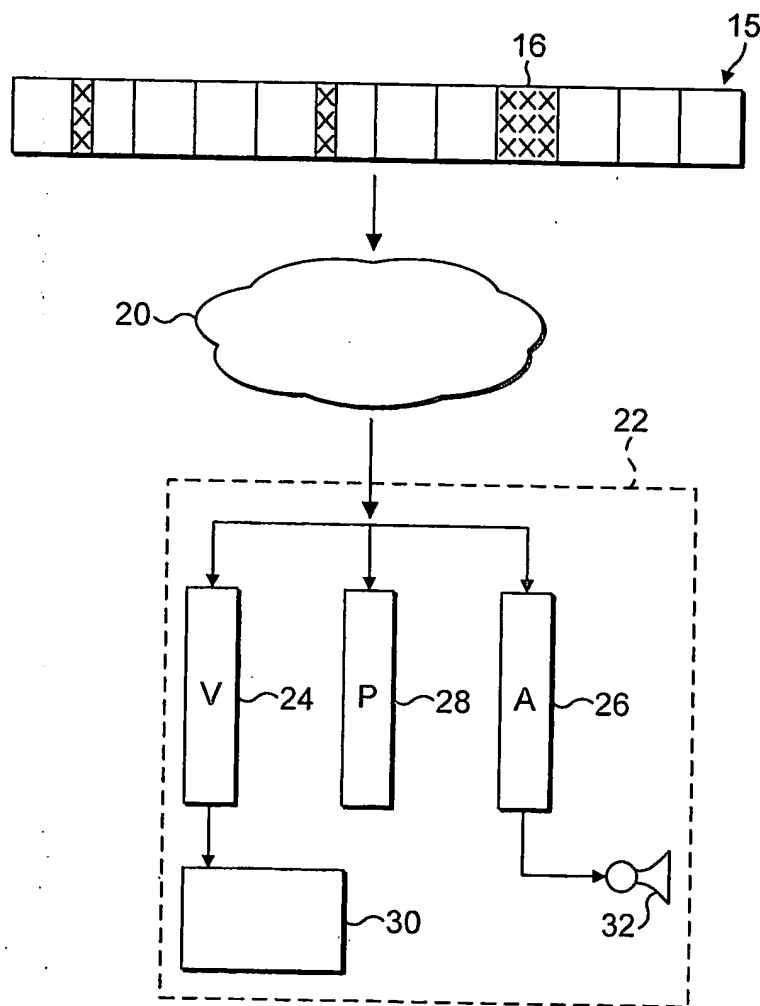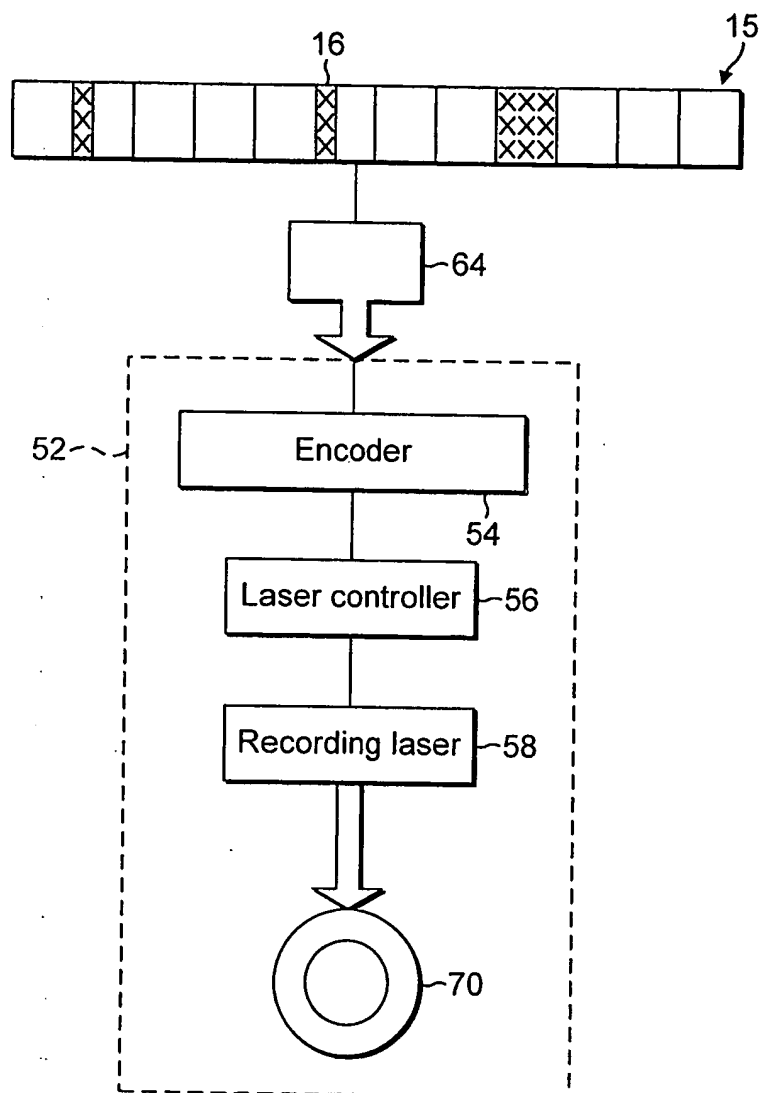   3
          4   RAW
          5

FIG. 4

FIG. 5

FIG. 6

INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7   G11B20/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7   G11B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 918 326 A (HEWLETT PACKARD CO) 26 May 1999 (1999-05-26) abstract column 1, paragraph 2 - column 1, paragraph 5 column 4, paragraph 15 - column 5, paragraph 17 -----	1-27
X	WO 02/11136 A (MACROVISION EUROP LTD ; HEYLEN RICHARD A A (GB)) 7 February 2002 (2002-02-07) abstract page 2, line 25 - page 4, line 29 -----	1-27

-/--

| [X] | Further documents are listed in the continuation of box C. | | [X] | Patent family members are listed in annex. |

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
12 May 2004	12-07.04

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Schoeyer, M

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	SCHOUHAMER IMMINK K A: "EFMPLUS: THE CODING FORMAT OF THE MULTIMEDIA COMPACT DISC" IEEE TRANSACTIONS ON CONSUMER ELECTRONICS, IEEE INC. NEW YORK, US, vol. 41, no. 3, 1 August 1995 (1995-08-01), pages 491-497, XP000539497 ISSN: 0098-3063 the whole document -----	1-27
A	KALKER T: "System issues in digital image and video watermarking for copy protection" MULTIMEDIA COMPUTING AND SYSTEMS, 1999. IEEE INTERNATIONAL CONFERENCE ON FLORENCE, ITALY 7-11 JUNE 1999, LOS ALAMITOS, CA, USA,IEEE COMPUT. SOC, US, 7 June 1999 (1999-06-07), pages 562-567, XP010342857 ISBN: 0-7695-0253-9 the whole document -----	1-27

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Box II. Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This International Search Report has not been established In respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☒ Claims Nos.: 28,29
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:

see FURTHER INFORMATION sheet PCT/ISA/210

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple Inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest   ☐ The additional search fees were accompanied by the applicant's protest.

☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM   PCT/ISA/ 210

Continuation of Box II.2

Claims Nos.: 28,29

The subject-matter the applicants intend to protect has not been properly defined in claims 28, 29.

Also the expression DSV data patterns as hereinbefore defined in independent claims 1 and 12 is so unclear that for this expression no meaningful search was possible. Thus "as hereinbefore defined" has been ignored.

The applicant's attention is drawn to the fact that claims relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure. If the application proceeds into the regional phase before the EPO, the applicant is reminded that a search may be carried out during examination before the EPO (see EPO Guideline C-VI, 8.5), should the problems which led to the Article 17(2) declaration be overcome.

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
EP 0918326	A	26-05-1999	EP	0918326 A1	26-05-1999
			DE	69706871 D1	25-10-2001
			DE	69706871 T2	11-04-2002
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			BR	0112805 A	01-07-2003
			CA	2416314 A1	07-02-2002
			CN	1466755 T	07-01-2004
			EP	1305799 A1	02-05-2003
			WO	0211136 A1	07-02-2002
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			JP	2004505403 T	19-02-2004
			US	2002076046 A1	20-06-2002